

Installation Manual

Volvo C30 T5 Front Mount Intercooler System



BIC Bell Intercoolers

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Important Information

Congratulations on your purchase of the Bell Intercoolers Volvo C30 T5 Front Mount Intercooler System. The installation instructions in this manual will assist you in the complete process of installing your new intercooler. Please read through these instructions entirely before you begin the installation process. This will familiarize you with the process and alert you to any unique tools or materials that may be required for successful installation.

This intercooler system is designed to be a bolt-in replacement for the factory components. Installation is not overly complex, however, it is important to honestly evaluate your mechanical skills and determine if you are capable of performing the installation or if you should have the system installed by a professional mechanic.

A modern internal combustion engine is a precise piece of equipment and while durable they can be severely damaged or destroyed through careless installation techniques.

To get the most performance from your new intercooler you will need to have an engine that is in a proper state of tune. Have any problems with the engine or vehicle corrected prior to installing the intercooler.

Parts List

| Part Name | Packet/Box | Qty |
|----------------------------------|---------------|-----|
| Intercooler Assembly | -- | 1 |
| M8 - 1.25 x 60mm Bolt - Hex Head | Parts - Bag 1 | 2 |
| M8 Flat Washer | Parts - Bag 1 | 2 |
| M5 - 0.8 x 20mm Bolt - Hex Head | Parts - Bag 1 | 1 |
| M5 Flat Washer | Parts - Bag 1 | 1 |
| Hose Clamp - T-Bolt 2.5" | Parts - Bag 2 | 2 |



Required Tools and Materials

To efficiently complete the installation of your intercooler you will need the following tools and materials, in addition to those parts supplied with your intercooler.

Tools

- 1/4" Drive Ratchet
- 1/4" Drive Extensions - 3" Length
- 3/8" Drive Ratchet
- 3/8" Drive Extension - 3" Length
- Sockets 8 - 17 mm (1/4" or 3/8" Drive)
- 11 mm Deep Socket
- Wrenches (Open/Boxed) 8 - 17 mm
- Straight Edge Ruler
- T20 and T30 Torx Bits and Suitable Driver
- Small Flat-head Screwdriver
- Phillips Screwdriver
- Hacksaw or Cutting Wheel
- Round and Flat File (optional)
- Vehicle Jack or Lift
- Jack Stands (x2)

Materials

- WD-40, Motor Oil or Lubricant
- Grease Pencil or China Marker (non-permanent)

1.0 Vehicle Preparations

As with any vehicle modification project, the process will be easier, faster and safer for the engine, turbocharger and you if the engine compartment is thoroughly cleaned before you begin the project. Not only is a dirty engine compartment a mess to work in, but a dirty engine compartment also offers the possibility that dirt and/or debris could be introduced into the intake tract of the engine.

A small stone or piece of debris falling into an open inlet tube can cause serious and expensive damage when the engine is started, possibly damaging valves, cylinders and pistons. An easily avoidable, but expensive proposition.

While performing the installation keep the any open intake tubes (air intake, etc.) covered with a clean rag and thoroughly check all tubes, hoses and the intercooler for any foreign objects or debris before installing.

1.1 Disconnect Battery

As a matter of safety you should disconnect the negative battery terminal before beginning any work on this installation. This is done to prevent any unintentional shorting of electrical components and to remove the danger of accidentally energizing the starter motor with a tool.

The battery is located in the right rear corner of the engine and is covered.

- Locate battery and remove cover (Fig. 1.1). To remove cover pull out on sides and lift front.
- Disconnect the negative terminal (Fig. 1.2) and move battery cable away from negative post.

1.2 Jack Stands or Lift

Installation of this intercooler system can be accomplished without placing the vehicle on a lift or jack stands. However, you will find the installation process much easier with the car elevated. If you will be lifting the car please consult Volvo service manual proper jack, jack stand and/or lift placement. Be sure vehicle is securely positioned before proceeding.



Figure 1.1



Figure 1.2

2.0 Removing Front Fascia (Nose Section)

The first step in the installation will involve removal of the front fascia (front nose section) of the vehicle (see Fig. 2.1). The front fascia of the C30 is comprised of two pieces, an upper section and a lower section, as shown in Figure 2.1. These two sections remain joined during the installation process and will not be separated. Attached to the front fascia are the upper grill assembly, the front license plate and mounting bracket, the driving light assemblies and driving light grills (if so equipped). All of these pieces remain attached to the front fascia when it is removed and only require that you disconnect one wiring connector for each driving light assembly, one per side.

In addition to the front fascia there is a plastic splash guard positioned underneath the engine. This piece must be removed for installation.

To reduce the chance of damaging the vehicle paint on the front fascia and the surrounding bodywork, we recommend you have someone available to help when removing the front fascia.

2.1 Remove Headlight Washer Covers (If so equipped)

If your vehicle is equipped with headlight washers there will be two headlight washer covers, one per side, that will need to be removed. This is actually the trickiest part of the entire installation process though it only requires patience and some time to get the covers off. It may be helpful to have someone to hold the covers in their extended position to allow you to see the clip mechanism that secures the covers.

- Carefully pull headlight washer covers away from the bodywork. These covers are attached directly to the headlight washer mechanism, be careful not to twist or damage washer mechanism.
- Insert a small screwdriver into the clip on the underside of the cover to release clip.
- Remove cover.
- Repeat for opposite washer assembly.

2.2 Splash Guard

- Locate and remove the seven (7) T30 Torx fasteners securing the splash guard.
- Remove splash guard.

2.3 Remove Front Fascia Fasteners

- The front fascia is secured by fasteners, plastic rivets and clips in the following locations:

| | |
|--|--|
| Passenger Fender Well | Fasteners (x5) |
| Driver Fender Well | Fasteners (x5) |
| Upper Radiator Bulkhead (across top) | Fasteners (x2), Plastic Rivets (x5) |
| Lower Radiator Support (across bottom) | Tabs (x3) |

- Remove the five (5) fasteners securing the front fascia in each fender well (see Fig. 2.3).
- Separate front of plastic fender lips from front fascia. Repeat for both sides.
- Using the T20 Torx bit remove the two (2) fasteners from the upper radiator bulkhead (see Fig. 2.4).



Figure 2.1

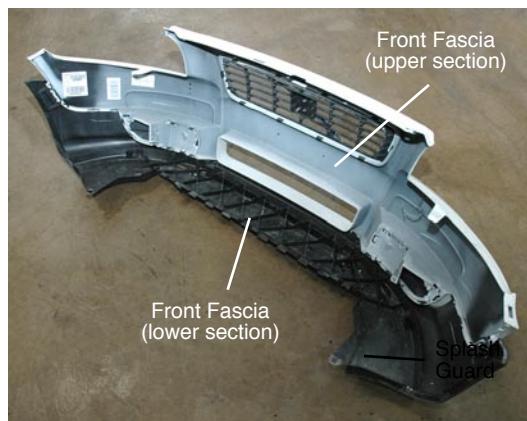


Figure 2.2

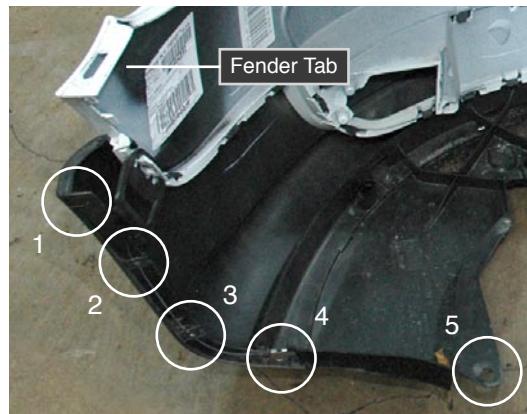


Figure 2.3

- Carefully remove the five (5) plastic rivets securing the front fascia to the upper radiator bulkhead (see Fig. 2.4). Please note, these rivets are designed to be reused. Using a Phillips screwdriver press the center section of the rivet down approximately 1/8", until you feel a click, when the rivet has released. Once released, you may extract the rivet from the hole. Repeat for all rivets.
- The lower section of the front fascia assembly is secured by three plastic tabs inserted into the metal lower radiator support. Using a screwdriver carefully release these tabs and pull the fascia assembly forward to disengage. The front fascia is now ready to be removed.

2.4 Remove Fascia

- Starting at the upper rear corners of the front fascia, pull fascia away from fender to release fender tab (see Fig. 2.3).
- Pull out the lower rear corners of the fascia to clear the lower edge of the fender liners. Repeat for other side.
- At upper radiator bulkhead, pull fascia forward to disengage from fenders.
- Working evenly across fascia begin to pull fascia forward, away from vehicle. Remember that you will need to disconnect the driving lights when the fascia does come free of the vehicle.
- Disconnect driving light harnesses, one per side, and remove front fascia (see Fig. 2.5, S40 model shown).



Figure 2.4

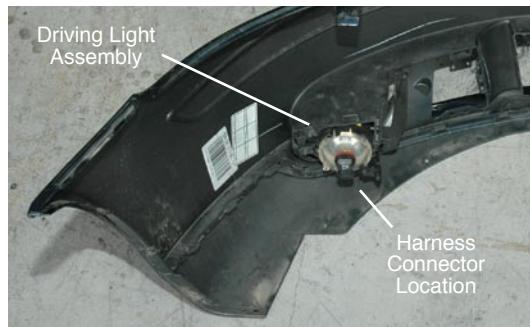


Figure 2.5

3.0 Removing Factory Intercooler

The C30 T5 utilizes a single intercooler design. The intercooler is secured to the radiator assembly by two (2) T30 mounting bolts.

3.1 Remove Intercooler Air Guide

- In front of the intercooler is the intercooler air guide (see Fig. 3.1). This plastic piece is attached to the radiator assembly two (2) fasteners and three (3) plastic tabs.
- Locate and remove the two (2) T30 fasteners securing the intercooler air guide to the radiator assembly. These are located at the upper corners of the intercooler air guide.
- Release three (3) tabs securing the bottom of the air guide to the radiator assembly (see Fig. 3.1).
- Carefully remove intercooler air guide.

3.2 Remove Intercooler Inlet and Outlet Hoses

- Locate the intercooler inlet hose. This hose is located on the left side (viewed from front of vehicle) of the intercooler (see Fig. 3.2).
- Loosen hose clamp securing intercooler inlet hose to intercooler and disconnect hose from intercooler.
- Locate the intercooler outlet hose. This hose is located on the right side (viewed from front of vehicle) of the intercooler (see Fig. 3.3).

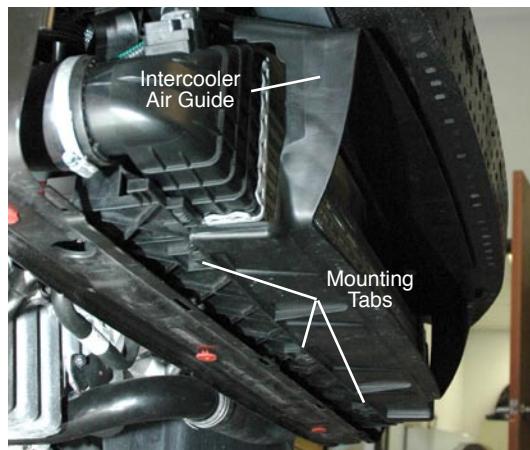


Figure 3.1

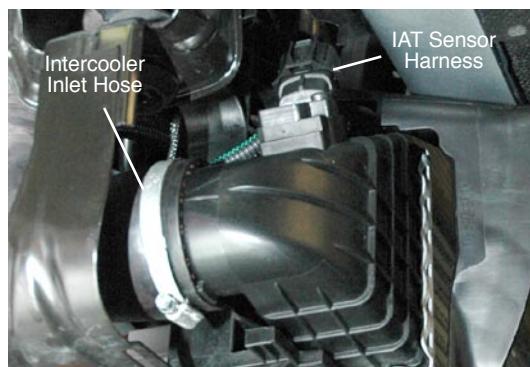


Figure 3.2

- Loosen hose clamp securing intercooler outlet hose to intercooler and disconnect hose from intercooler.

3.3 Remove Hose Clamps

The factory hose clamps will be replaced with high-strength T-bolt hose clamps for use with your new intercooler. You will need to remove the factory hose clamps prior to installing the new intercooler.

- Carefully remove factory hose clamps from intercooler inlet and outlet hoses. These clamps are secured by a small metal barb that grips the rubber hose. To release the barb carefully pry barb away from hose. Once the barb is clear of the hose you may safely remove the hose clamp.

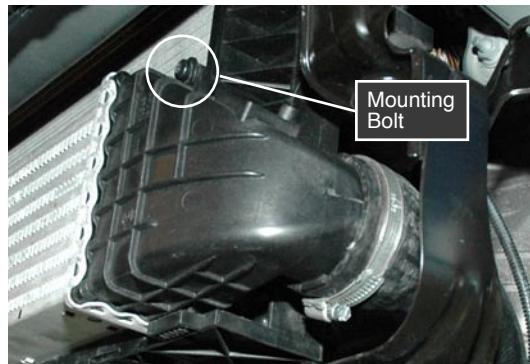


Figure 3.3

3.4 Disconnect Intake Air Temperature (IAT) Sensor Harness

- Locate wiring harness connected to Intake Air Temperature (IAT) sensor (see Fig. 3.2).
- Disconnect wiring harness from IAT sensor.

3.5 Remove Intercooler

- Locate and remove the two (2) T30 Torx fasteners securing the intercooler to the radiator assembly, one fastener per left and right side (see Fig. 3.3).
- Intercooler is positioned with two plastic tabs at the lower corners. Lift intercooler to disengage these tabs and remove intercooler.

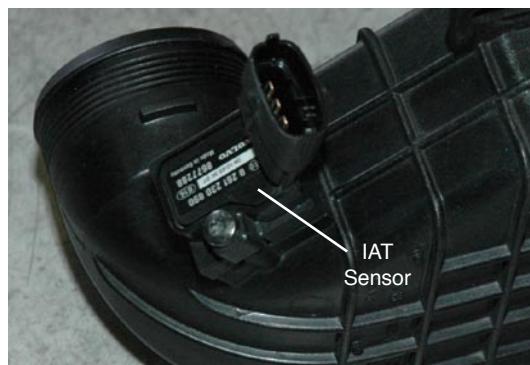


Figure 3.4

3.6 Remove IAT Sensor

- Locate the IAT sensor on intercooler (see Fig. 3.4).
- Remove the one (1) T20 Torx fastener securing IAT sensor to intercooler.
- Carefully remove IAT sensor from intercooler. Sensor uses an o-ring, use care when removing the sensor so as to prevent damage.

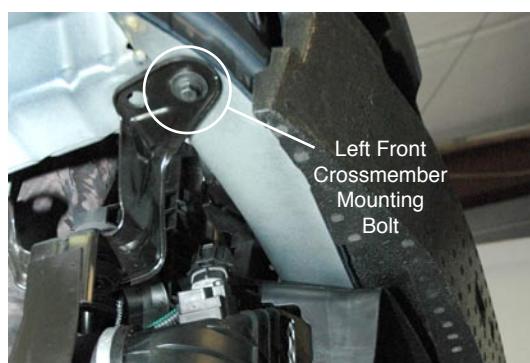


Figure 3.5

3.7 Remove Crossmember Mounting Bolts

Your new intercooler will be mounted using the front two (2) bolts securing the radiator lower crossmember (See Figs. 3.5 and 3.6).

- Locate and remove indicated fasteners (see Figs. 3.5 and 3.6).



Figure 3.6

4.0 Installing New Intercooler

New Components

| | |
|----------------------------------|------|
| Intercooler Assembly | (x1) |
| M5 - 0.8 x 20mm Bolt - Hex Head | (x1) |
| M8 - 1.25 x 60mm Bolt - Hex Head | (x2) |
| M5 Flat Washer | (x1) |
| M8 Flat Washer | (x2) |
| Hose Clamp - T-Bolt 2.5" | (x2) |

4.1 Install IAT Sensor

Prior to installing the new intercooler you will need to install the factory IAT sensor. This sensor installs in the same general position as

the on the factory intercooler. Refer to Figure 4.1 to ensure proper orientation of the sensor relative to the intercooler.

- Apply a thin coating of motor oil to the IAT sensor o-ring.
- Carefully insert sensor into new intercooler. Position as shown in Figure 4.1.
- Install M5- 0.8 x 20mm bolt and M5 washer (supplied with intercooler kit) to secure fastener. Tighten fastener.

4.2 Install T-Bolt Hose Clamps

The T-Bolt hose clamps must be installed prior to installing the intercooler. Refer to Figures 4.2 and 4.3 for proper orientation of clamps to allow for correct clearance of the clamp bolts after installation.

- Position hose clamps on intercooler inlet and outlet hoses. Do not tighten.

4.3 Install Intercooler

The new intercooler will mount using new fasteners supplied with the kit. These fasteners will install in place of the factory fasteners securing the lower radiator crossmember that you removed in step 3.7. Be aware that you will be reconnecting the IAT sensor harness to the intercooler after installation. Place wiring harness so it does not become trapped or restricted during installation of intercooler.

- Move intercooler into position with mounting brackets located as shown in Figures 4.4 and 4.5. Be sure hose clamps are in position as described in step 4.2.
- Installed M8 - 1.25 x 60mm bolt and M8 washer at each mounting point. Do not tighten fasteners.
- Position intercooler so there is a consistent gap of approximately 1/8" between the intercooler and the radiator assembly (see Fig. 4.6). When this gap is established, tighten mounting fasteners.

4.4 Reconnect IAT Sensor Wiring Harness

- Reconnect wiring harness to IAT sensor. Check to be sure wiring harness is not restricted, kinked or pinched by intercooler. Adjust if necessary.

4.5 Install Intercooler Inlet and Outlet Hoses

For proper installation the hose clamps must be positioned behind the hose bead as shown in Figure 4.7. Before installation of intercooler hoses mark all intercooler tubes with a line 1" from the bead, as shown in Figure 4.7. This will allow you be sure the clamp and hose are properly positioned. There should be approximately 1/8" between the edge of the hose and the edge of the clamp when installed.

Hose clamps should be tightened to the point where the hose cannot be rotated against the metal tube. Overtightening can result in cutting and damaging the hose.

- Slide intercooler inlet and outlet hoses onto intercooler.
- Position and tighten T-bolt hose clamps. Clamps should be positioned as shown in Figures 4.2 and 4.3. Be sure that the clamp bolts do not contact any surrounding components. Adjust as necessary.

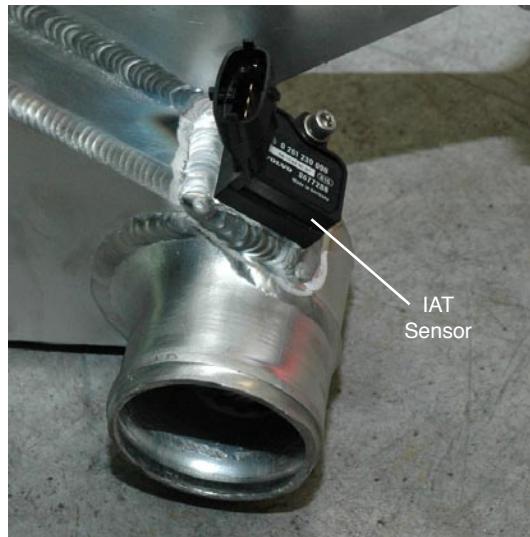


Figure 4.1

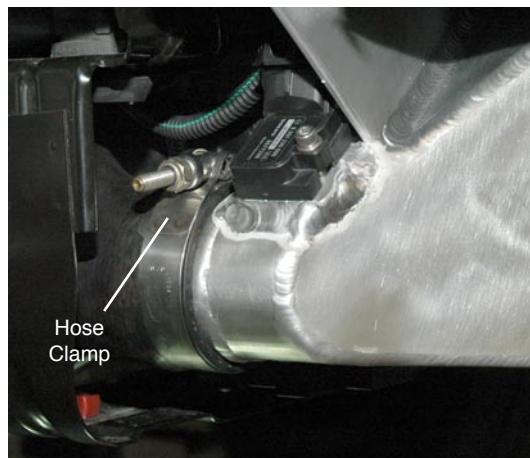


Figure 4.2

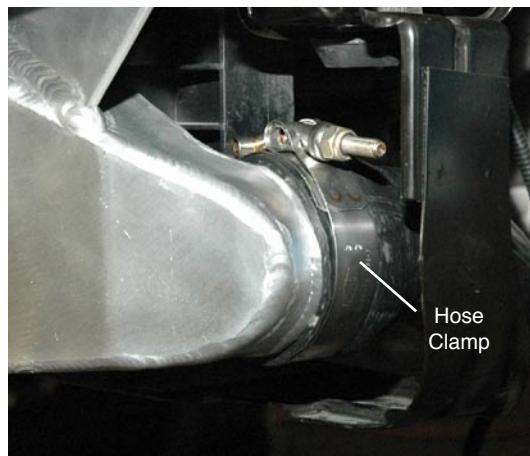
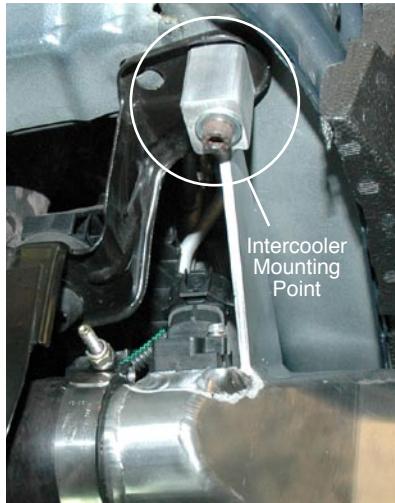


Figure 4.3

4.6 Recheck All Fasteners, Hose Clamps and Connections

Before proceeding, recheck all hose clamps for proper installation and clearance. Also recheck intercooler position (as per step 4.3) and all mounting fasteners. Recheck IAT sensor harness to be sure it is properly connected.



Left-Side Mounting Point

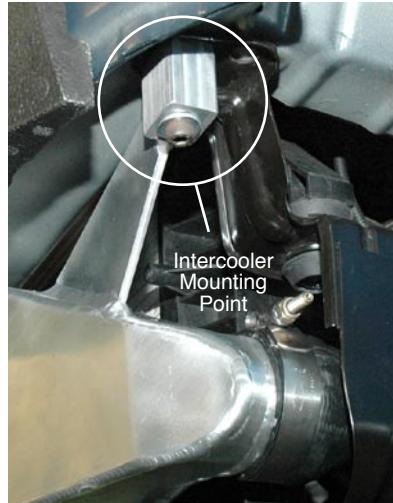


Figure 4.5

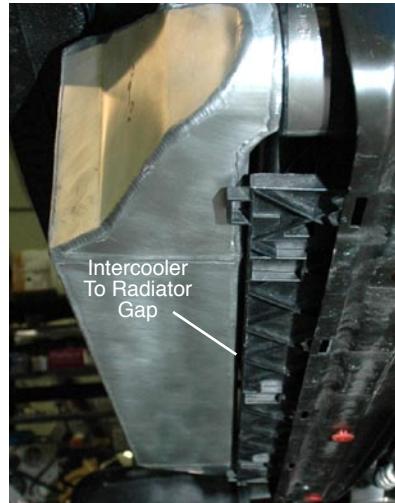
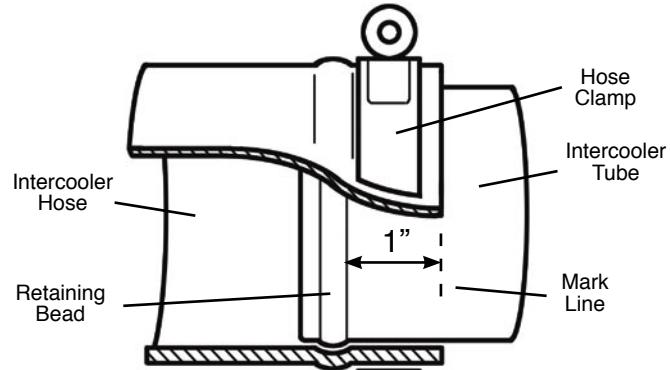


Figure 4.4

Figure 4.6



Hose and Clamp Placement Diagram

Figure 4.7

5.0 Start Engine and Check Connections

Before reinstalling the front fascia body work it is recommended that you remove the car from the jack stands or lift in order to check engine operation and make sure all components are functioning properly. The car will be started, but not be driven at this time, to determine that all components have been connected properly. Do not start car while on jack stands.

- Remove car from jack stands or lift.
- Reconnect battery.
- Start engine and allow engine to warm to operating temperature.
- Engine should idle and rev normally. If it does not, shut off engine and check for loose intercooler hose connections and disconnected IAT sensor wiring harness. Restart engine and check for normal idle and revs.
- Shut off engine and disconnect battery.
- Place car back on jack stands or lift to complete installation of front fascia bodywork.

6.0 Trim and Install Front Fascia (Nose Section)

This step requires relatively easy trimming of the plastic and urethane components of the front fascia. All trimming can be easily accomplished with a hacksaw or cutting wheel and cleaned up with a file and sand paper.

6.1 Remove Lower Grill Insert

The plastic grill insert in the lower grill opening is secured by nine plastic tabs. Carefully release tabs and remove grill insert.

6.2 Mark and Trim Lower Grill Opening

- Standard Trim Pattern

To provide adequate room for the new intercooler it is necessary to trim the back of the lower grill opening. For more aggressive cooling of the intercooler you may wish to use the optional trimming pattern shown in Step 6.3 (see Fig. 6.2).

- At each corner of bottom surface mark a line 1/2" from back edge (see Fig. 6.1).
- At each corner of top surface mark a line 1/2" from back edge (see Fig. 6.1).
- Using a straight edge, mark line across bottom surface connecting corner marks (see Fig. 6.1).
- Repeat for top surface (see Fig. 6.1).
- Draw lines on side surfaces connecting upper and lower corners (see Fig. 6.1).
- Using hacksaw or cutting wheel, carefully cut along lines.
- Carefully clean up cut edges with file and/or sandpaper.

6.3 Mark and Trim Lower Grill Opening

- High Temperature Trim Pattern

If you are planning on running your car at track events or if you live in a hot climate you may wish to use a more aggressive trimming option for the grill opening. This option removes more material from the upper surface of the grill opening which allows more air to reach the upper portion of the intercooler core. This trimming pattern is shown in Figure 6.2.

- At each corner of bottom surface mark a line 1/2" from back edge (see Fig. 6.1).
- Using a straight edge, mark line across bottom surface connecting corner marks (see Fig. 6.1).
- At each corner of top surface, points A and D in Figure 6.2, mark a line 1/2" from back edge.
- As shown by points B and C in Figure 6.2 make a mark 1 1/2" from back edge of upper surface and 1 1/2" from the outer edge of the upper surface. Repeat for both sides of upper surface.
- Using a straight edge, mark line connecting points A and B, B and C, C and D, as shown in Figure 6.2..

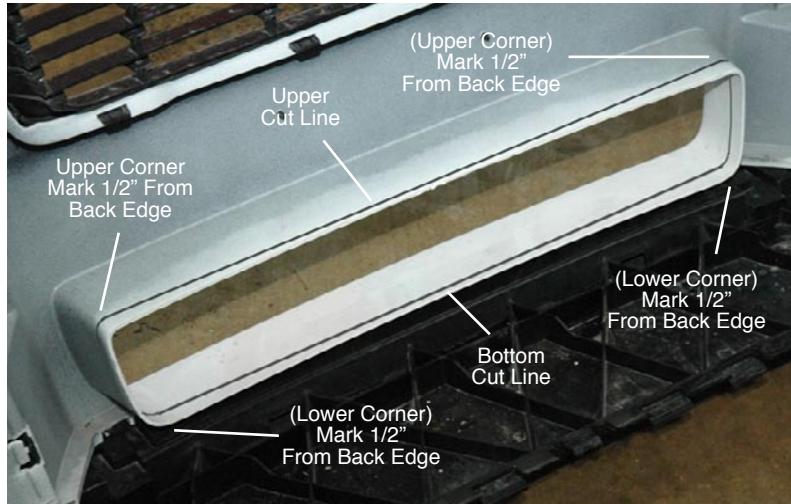


Figure 6.1

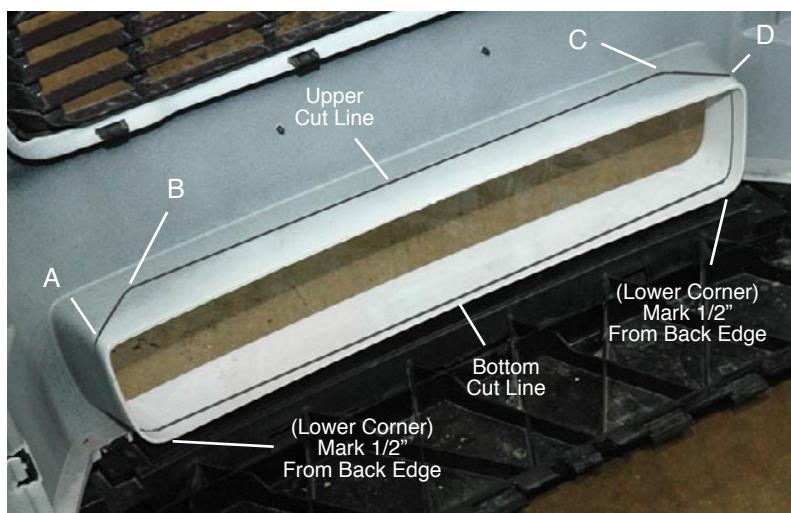


Figure 6.2

- Draw lines on side surfaces connecting upper and lower corners (see Fig. 6.1).
- Using hacksaw or cutting wheel, carefully cut along lines.
- Carefully clean up cut edges with file and/or sandpaper.

6.4 Reinstall Front Fascia

Reinstall front fascia in reverse sequence of removal process (see Step 2.0, pg 2).

- Position front fascia in front of car and connect driving light wiring connectors (if so equipped).
- Lift fascia and guide into position.
- Guide tabs below headlights into position.
- Guide upper fender tabs into position at each corner of the upper radiator bulkhead.
- Guide lower corners of fascia over fender liners (one per side).
- Gently press fascia into position.
- Guide three mounting tabs into position along lower radiator support.
- Press fender tabs into position on each side.
- Check fascia for proper fit and alignment against fenders and headlights. Adjust as necessary.
- Reinstall plastic rivets and fasteners across upper radiator bulkhead.
- Reinstall headlight washer covers (if so equipped).
- Clip fender lips into position, repeat for both sides.
- When installed, there should be a 1/8" - 1/4" gap between the intercooler surface and the back of the lower grill opening (see Fig. 6.3).



Trimmed Fascia Installed

Figure 6.3

6.4 Reinstall Splash Guard

Reinstall splash guard in reverse sequence of removal process (see Step 2.2, pg 2).

- Reinstall and tighten seven (7) T30 Torx fasteners securing splash guard.

7.0 Test Drive and System Checks

Testing should be done with the radio and AC/heat fan off and with all windows rolled up to allow you to properly hear the engine. Allow engine to reach operating temperature and make certain the engine is running smoothly and normally, both at idle and under load, prior to applying boost.

It is recommended that you recheck all intercooler tube connections after 500 miles to be sure all hoses and clamps are in proper position. This is also the time to check for any potential clearance issues.

Installation is now complete.